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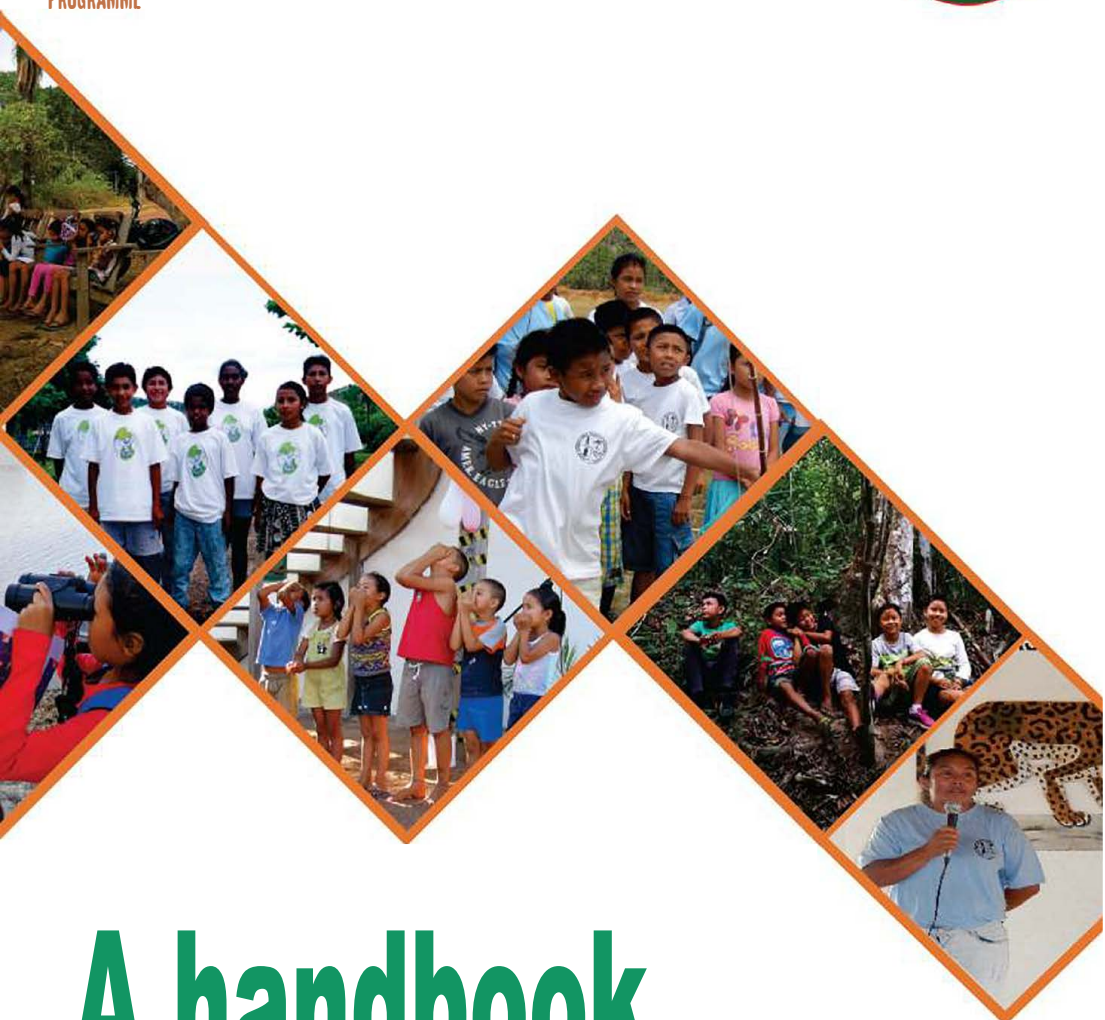
SWM SUSTAINABLE WILDLIFE MANAGEMENT PROGRAMME

NORTH RUPUNUNI JUNIOR WILDLIFE & DEVELOPMENT COUNCIL



A handbook for wildlife clubs

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A HANDBOOK FOR WILDLIFE CLUBS

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Concept and text by
Samantha James
North Rupununi District Development Board
2021

CONTENTS

Foreword..... iv
The club works: wild for wildlife..... 1-3
When in the field, protect yourself and others from COVID-19 do & don't. 4
Reporting back to your club & village council..... 5
Financial reporting..... 6
Monitoring for management..... 7
Animals..... 8
Bird is the word..... 9
Feathers..... 10
Identifying birds..... 11
Use of feathers..... 12
Leave the wild in the wild..... 12
Animal can't talk, but they can tell you a lot about your environment!..... 15
Some things to consider when looking for wildlife..... 14
Bird monitoring..... 15
Example of a bird monitoring data sheet..... 17
Using a camera trap..... 18
Example of a camera trap data sheet..... 19
Analyzing the camera trap data..... 19
Graph showing camera trap data..... 20
Data tells a story..... 20
What does it mean?..... 20
Possible citizen science questions..... 22
Vocabulary word search..... 24
Vocabulary crossword puzzle..... 25
Fisheries management in the North Rupununi..... 26
World search - Fish of the North Rupununi..... 27
Arapaima poem..... 28
The North Rupununi Junior Wildlife Development Council..... 28
Glossary..... 29
Acknowledgements..... 30

FOREWORD

The SWM Programme is providing support to the North Rupununi District Development Board (NRDDB) to help develop the skills of young people in Wildlife Clubs. Samantha James, who has worked with clubs for over 16 years, tailored this handbook for the clubs of the North Rupununi, and it includes beautiful illustrations by local artists. We hope this handbook will be used by club members as a guide as it includes information about governance, taxonomy, monitoring protocols and fisheries management in the North Rupununi.

Community-owned wildlife clubs in the North Rupununi provide an opportunity for young people to develop their interest in the environment and the skills for monitoring. These skills are easily transferred to leadership roles as guides, community leaders, teachers and rangers and we look forward to today's youth becoming tomorrow's leaders.

Jacqueline Allicock,
NRDDB Chairperson

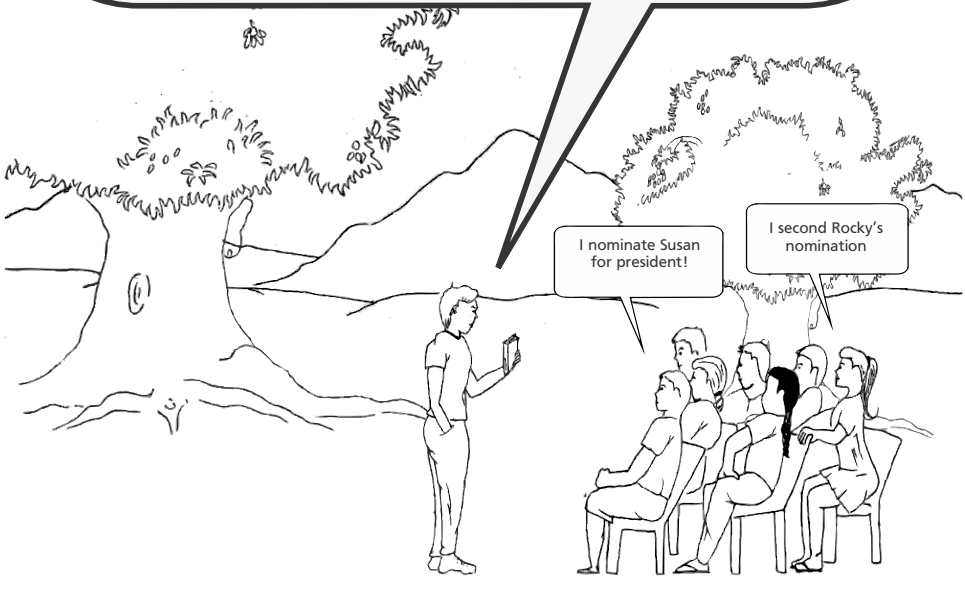
THE CLUB WORKS: WILD FOR WILDLIFE!

Good afternoon club members! My name is Wally, your club coordinator.

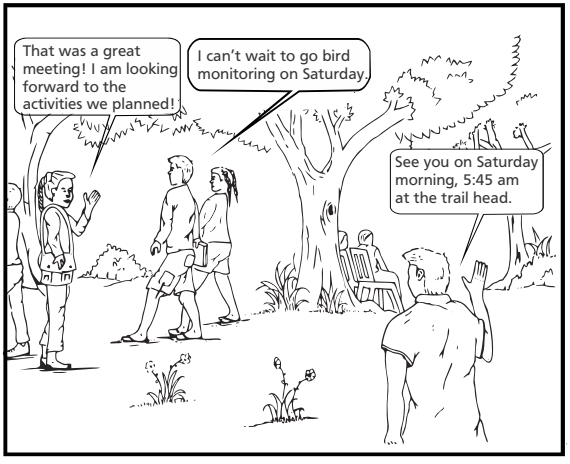
During today's meeting, we will elect a new **executive** body and plan the month's activities!

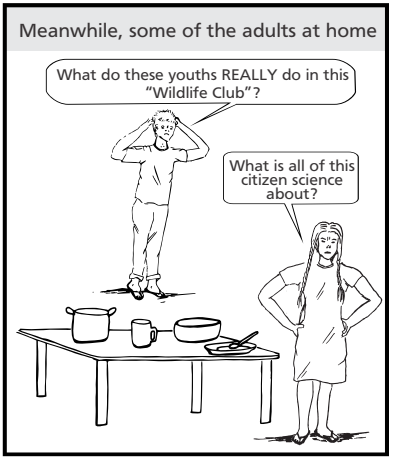
The executive will be made up of a:

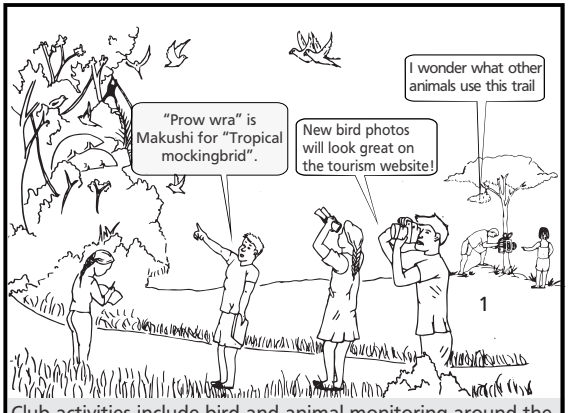
- **President**, who will work with the team to ensure all club activities are successful;
- **Vice president**, who will assist the president in all matters and club activities;
- **Secretary**, who will write and keep minutes of club meetings and assist the President in reporting matters;
- **Treasurer**, who will is held accountable for all monies, finds ways to raise funds, and provides financial reports to the club; and
- **Secretary Treasurer**, who will assist the secretary and the treasurer in their reporting activities as well as supports the executive to implement activities.



At the first monthly wildlife club meeting, youth meet to discuss and plan club activities and leadership.

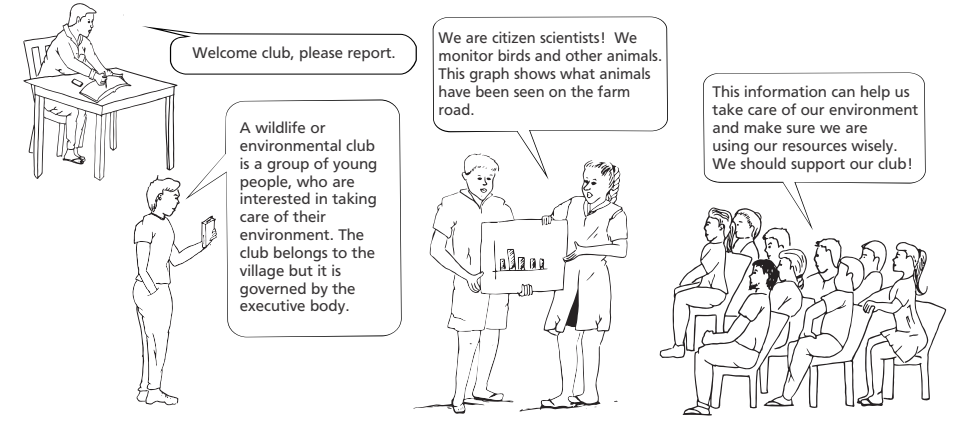

That was a great meeting! I am looking forward to the activities we planned!
I can't wait to go bird monitoring on Saturday.
See you on Saturday morning, 5:45 am at the trail head.


Meanwhile, some of the adults at home
What do these youths REALLY do in this "Wildlife Club"?
What is all of this citizen science about?


"Prow wra" is Makushi for "Tropical mockingbrid".
New bird photos will look great on the tourism website!
I wonder what other animals use this trail
1

Club activities include bird and animal monitoring around the community; results can be used for management and tourism. This is an example of citizen science, or community-based research.

At a village meeting....
We will remind the club that they must report at village meetings.
I see them looking at birds, and setting camera traps. The village could use this information for planning. It would be a good idea for the club to report. Meanwhile some of the adults could work with them in the future.

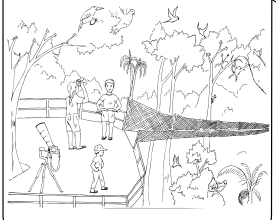

Welcome club, please report.
A wildlife or environmental club is a group of young people, who are interested in taking care of their environment. The club belongs to the village but it is governed by the executive body.
We are citizen scientists! We monitor birds and other animals. This graph shows what animals have been seen on the farm road.
This information can help us take care of our environment and make sure we are using our resources wisely. We should support our club!

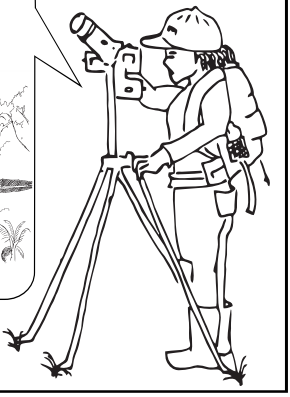
At the next meeting, the club shares information about their activities and plans and presents a report to the village council.

Many conservation leaders have been involved in the wildlife club at some point in time.

I am a bird guide.

I learnt a lot about birds through the club.

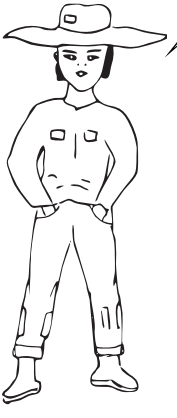




Some members of the culture group are also in the wildlife club. The culture group also works with the club to share traditional stories about animals and birds.

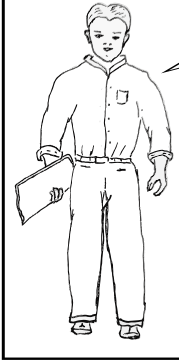
I was a wildlife club member. Now I am a ranger.

I am a community resource environmental worker, or CREW. I am a club member and help the club with their monitoring.



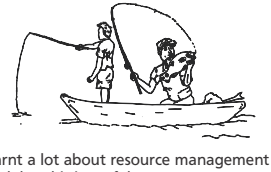
After school, I help the club to **analyze** their monitoring data.

Monitoring activities help strengthen maths and English skills.



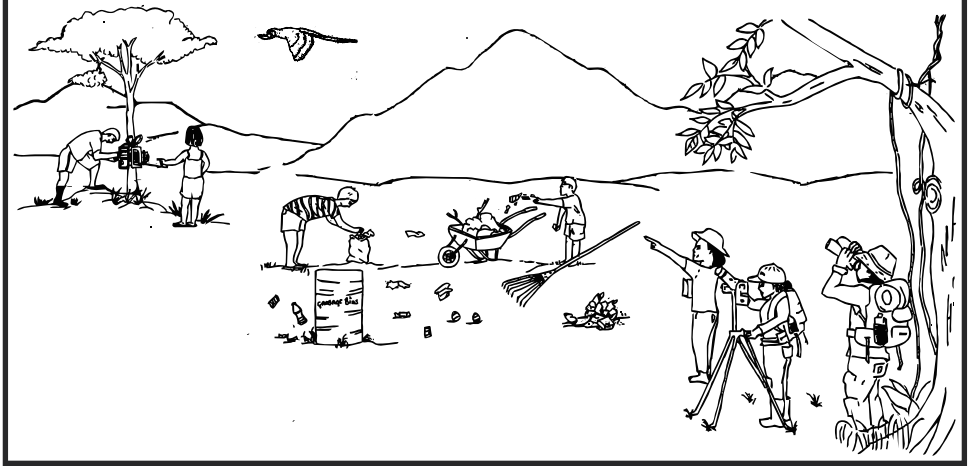
I manage the NRDDB's fisheries program.

I acquired public speaking, reporting and planning skills the club. These skills really help me with my work.



I learnt a lot about resource management in the club. This is useful as I am a farmer and fisher.

Community members agree that the wildlife club can contribute to education and leadership skills, and that club activities can contribute to resource management. They ask the club to report at all village meetings and pledge support to club activities like wildlife monitoring, compound clean up and bird watching.



When in the field, protect yourself and others from COVID-19

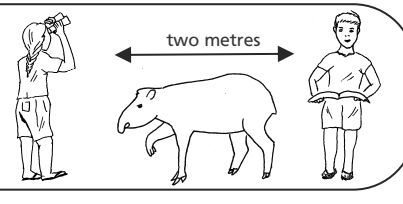
DO

- ✓ Wear a mask properly.
- ✓ Stay at least three to six feet (one - two metres) away from others you don't live with.
- ✓ Avoid crowds or mixing in large groups.
- ✓ Wash your hands often or use a hand sanitizer that contains at least 60% alcohol and rub hands together until dry.
- ✓ Clean and disinfect equipment before and after use.
- ✓ Cough and sneeze in your bent elbow.
- ✓ Remind and help younger club members to follow these steps.

DON'T

- ✘ Participate in group activities if you feel sick, have tested positive for COVID-19, or know you were recently exposed to COVID-19.
- ✘ Participate in large group activities with more than ten people.
- ✘ Share equipment.
- ✘ Share food items such as cups, bowls, drinks and food in shared containers with people outside your household.
- ✘ Wear a mask while engaging in activities where the mask might become wet, like when swimming.

Practice social distancing.
Stay one to two metres apart!



REPORTING BACK TO YOUR CLUB & VILLAGE COUNCIL

It is important to keep a record of what was said and done during club meetings. This helps the club and its members achieve goals and holds everyone accountable for their promises.

A copy of the same report can be presented to the Village Council. This gives others an opportunity to learn about the club and shows that the club is an important part of village work and development.

This is an example of what meeting minutes can look like:

Name of Club : Annai Wildlife club ← **Club name**

Venu of Meeting : Annai Primary School ← Location of meeting

Date of Meeting : 8-07-2020 ← Date of meeting

Time Commence : 13:30 HRS

Members / Persons Present ← List of people who attended the meeting

1 Tom Henry Club President
2 Mary John Club Vice President
3 Lynn Andries Club Member
4 Zeya Lourindo Club Secretary
5 Ann Andries Club Member
6 Sunil Moses Club Member
7 Victor Joseph Club Coordinator
8 Maria Allicock Club Member

Minutes of last Meeting - were read and accepted. ← Proof that the minutes from the last meeting were read and everyone agreed on what was said

Activities - The Secretary reported that the Toushau had granted permission to use the Village play field for our club sports Day. The President announced the date of sports to all members. ← Things that were agreed on in the meetings

Nature Trail - The Secretary asked members of the club to turn out to clean the Nature trail on Friday, August 15, 2020 at 09:00 hrs.

Date of next Meeting - was set for September 1, 2020. ← Date of next meeting

Prepared by Secretary
Zeya Lourindo. ← Name of the person who wrote the minutes

FINANCIAL REPORTING

The treasurer supports the club by taking care of the club's money. It is important that the treasurer works with the executive to ensure that it is clear on how money is made and spent and how much money the club has.

The treasurer is responsible for keeping financial records and making a financial report to go with the club report. The finances should be reported at club meetings and at village meetings when the club report is presented.

Name of the Club: Annai Wildlife Club Report prepared

Date of Report: 31 August, 2020 by: Z Lourindo

Balance as of 30 June 2020 GYD 5 020

Income

Bring and buy sale	GYD 6 500
Club Membership	GYD 2 000
Sub total	GYD 8 500

Expenditure

Batteries – 4 pair	GYD 1 200
Pencils and notebooks	GYD 5 000
Torchlight	GYD 3 000
Sub total	**GYD 9 200**

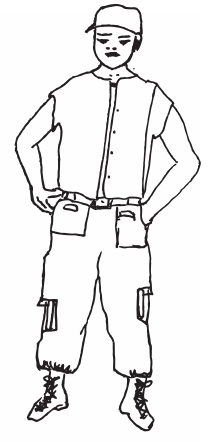
Balance at last report	GYD 5 020
Income (add)	GYD 8 500
Expenditure (subtract)	GYD 9 200
Balance (remaining)	**GYD 4 320**

Balance as of 31 August 2020 – GYD 4 320

Signed by: Z. Lourindo

MONITORING FOR MANAGEMENT

Natural resource management is taking care of things in nature (plants, animals, forest, water, air) so that we can continue to use and enjoy these things in nature.



Monitoring is an important part of management. To take care of our environment and the things that live in it, we need to know what's there. Monitoring is keeping an eye on things so that you can use them with care.

On the farm, you monitor the growth of the cassava, the pests that threaten it, the game that visit, and the weather. All of these things affect the cassava crop. Monitoring also tells you when it's time to harvest.

Bird watching and animal monitoring can tell you a lot about seasons, the behaviour and population of animals, as well as the people using the area.

If you monitor the same **transect** or trail over a period of time, the data or information about the animals will eventually tell a story about the animals, plants, and things that happen there.

This is important as many animals, including humans, use and share the same areas. Monitoring wildlife can also help to avoid conflict with animals. If we know when, how and by whom and area is used, rules can be developed to **mitigate**, or avoid conflict.

Regulations for management can then be developed to protect an area and work to ensure resources like fish, game or plants for the future, protecting species for breeding and growing, then harvesting.

Conflict occurs when animals and humans have a negative impact on each other. **Predators** like caiman and otters may come into conflict with humans by taking fish from nets and boats and, in extreme cases, by attacking humans they mistake for fish. Jaguar and puma **prey** on livestock, andPeccary and other animals may destroy our farm.

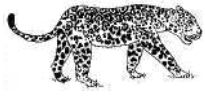
Conflict often usually ends up with angry, hungry people, and dead or injured animals.

ANIMALS

There are millions of different animals on the planet. The North Rupununi Wetlands are high in **biodiversity**, and it is estimated that there are over 1 414 **species** of animals here.

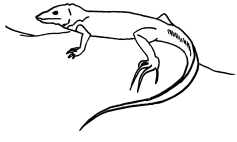
Except for insects, the animal groups listed here are **vertebrates** and have a backbone.

Animal Group	# of Species
Birds	643
Fish	>410
Mammals	>191
Reptiles	>103
Amphibians	>67
Area (**km**^{2})	32 800
Totals	**>1 414**



Mammals feed their babies milk; almost all have fur or hair and are **endothermic**. Jaguars, monkeys, dolphins, bats and humans are mammals.

Birds are the only animals that have feathers. They have a beak and wings, but not all can fly. All birds are endothermic, lay eggs and take care of their babies. Jabiru storks, ducks and kingfishers are birds.



Reptiles have dry, scaly skin and almost all lay eggs. Reptiles are **exothermic**; their body does not make heat and they rely on the warmth or the cool of their environment to regulate their body temperature. Lizards, snakes, turtles and caiman are reptiles.

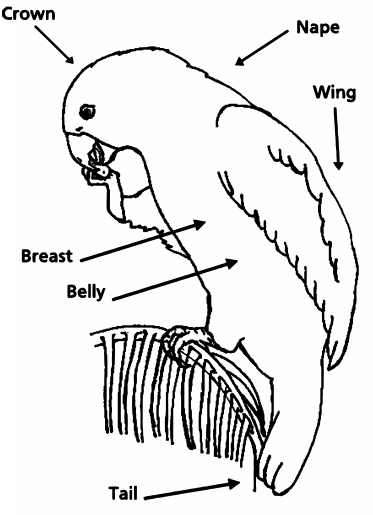
Amphibians are exothermic animals with soft, damp skin and need to keep their skin moist to stay alive. They lay soft eggs in water where their young hatch and grow. Adults can live on land and in water. Frogs and toads are amphibians.

Insects are **invertebrates**; they have six legs and some have wings, but all go through **metamorphosis** to change into their adult bodies. For example, a caterpillar pupates in a cocoon, and emerges as a butterfly that lays eggs. Dragonflies lay eggs in water which hatch out to **nymphs** that live in the water. The nymph pupates and becomes a dragonfly that flies in the air.

Fish live in water; they breathe by pushing water over rows of feathery gills at the back of their mouths, which take oxygen from the water. They are covered in smooth plates called scales and may lay hundreds of eggs. Only a few species of fish such as arapaima take care of their babies.

BIRD IS THE WORD

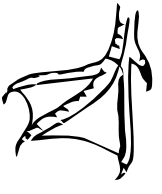
Compared to humans, birds are very efficient breathers. In order to supply muscles with the oxygen necessary to power flight, air is always circulating in their lungs (a system of 9 different air sacs), and fresh air is constantly entering the lungs, flushing out stale air, providing a rich supply of oxygen.

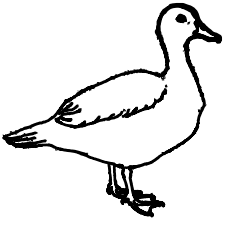


Bird bones have air-filled **cavities** which make their skeleton light but strong. Most birds have **anisodactyl** feet, with three toes facing forward and one toe facing backward.

Parrot feet are **zygodactyl**, with two toes facing forward, and two facing back. This toe structure allows them to grip tree branches, or even hang upside down! Parrots also use their bills to help them climb or hold on to things.

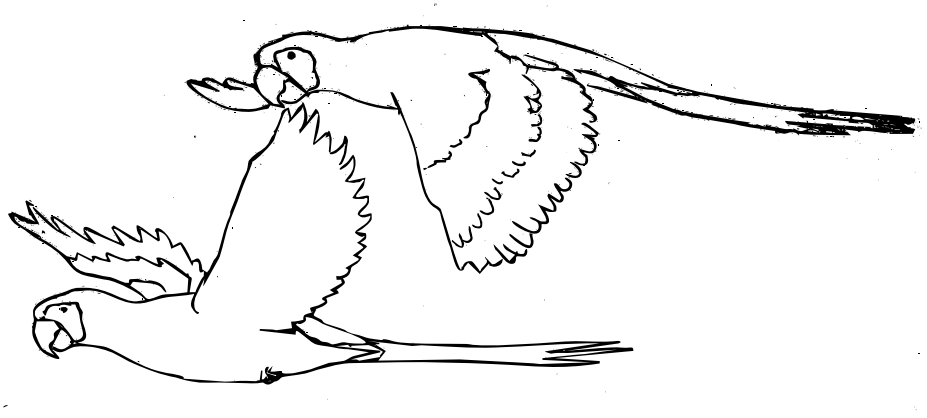
Toucans are not parrots, but more closely related to woodpeckers. Toucans, woodpeckers and woodcreepers also have zygodactyl feet which allow them to hold onto trees.





Draw a line from the bird to the type of feet it has!

IDENTIFYING BIRDS



Identifying a bird correctly can be a challenge! Birds move quickly and colours can look different in bright sunlight or deep shade. Some things to look out for:

- sound of the call and song;
- shape of the beak;
- tail position (up, straight out, straight down);
- shape and length of the legs;
- the way it moves (jumping, walking, hopping, how it uses it's beak);
- where you saw it (standing on the ground, watching from a tree, flying over a pond); and
- type of flight.

Direct flight is straight and level with constant flapping (ducks and parrots).

Flap and gliders take breaks from flapping from soaring to gliding (tanagers, storks).

Gliders position their wings so they can push air down, causing them to slow down but stay in the sky (swifts and swallows). Birds that travel long distances will also glide to help save energy.

Hawking is swooping back and forth from a perch in a circular motion to hunt insects on the wing (flycatchers).

Hovering is staying in place with high-speed flapping (hummingbirds).

Soaring is using rising currents of hot air and long wings to fly without flapping (vultures).

Undulating flight is a roller coaster style, alternating between rising during hard flapping and falling during gliding (toucans and woodpeckers).

FEATHERS

Feathers are special structures unique to birds; they are made out of **keratin**, the same material as your hair and fingernails.

To keep feathers in good condition for flying, birds must **preen** their feathers to clean and reshape them with their bills. Birds also scratch, bathe and sun their feathers to clean them and get rid of bugs. Every year or so, they **moult**, or change their feathers.

Feathers are flexible, allowing them to shift and separate as air moves over and through them, reducing the drag on the bird's body.

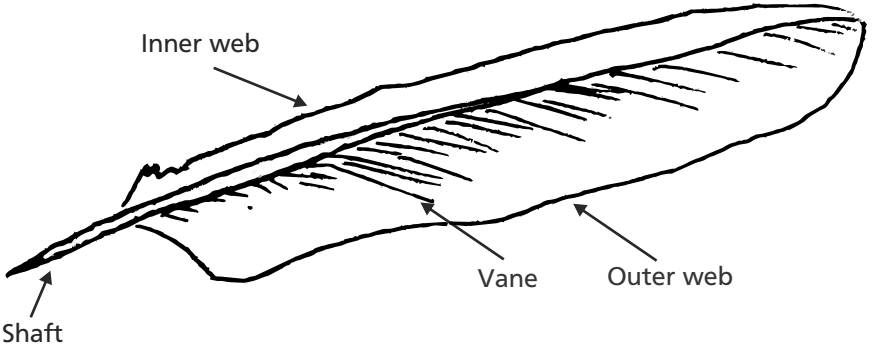
Down feathers have a very short shaft and long, flexible, fluffy barbs which provide insulation by trapping air between feathers to decrease heat loss.

There are two types of contour feathers: body and flight feathers.

Contour feathers are smooth, **aerodynamic** feathers on the body which act as a shell, covering the body and protecting the soft downy feathers underneath.

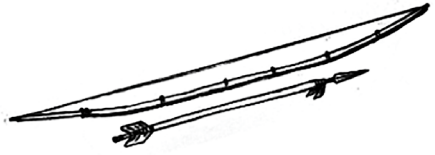
Strong, rigid, but flexible **flight feathers** on the tail and wings provide the power for flight. These feathers are **asymmetrical**; one web is narrower than the inner web. This allows airflow over them and provides some of the lift and thrust necessary for flight.

Secondary feathers are further in on the wing and closer to the body. They provide lift and help the bird to glide and fly.



USE OF FEATHERS

Some Indigenous people use feathers to decorate baskets, headwear and clothing. Parrot feathers are not good to use on arrows. Parrots are noisy birds and their feathers would chase away fish and game.



LEAVE THE WILD IN THE WILD

Some people keep parrots or wild animals as pets. Wild animals do not make great pets because part of them will always remain wild. Their instinct is to behave in a wild manner, and they may bite and injure people.

Domestic animals like dogs make better pets.

Some things to consider before taking a pet parrot:

Do not support the illegal **wildlife trade**.

Parrots can live a very long time, and macaws can live up to 100 years. Unless you are committed to taking care of a parrot for its life span, it's probably not a good idea to have a pet parrot. Parrots are a lot like people; they are **social**, smart and have individual personalities. They have families, care for their young and can solve basic problems like cracking nuts or taking keys off a ring.

If parrots get stressed, bored or lonely, they will pluck their feathers out. They are also very noisy and like to get into things you might not want them to. They can be very choosy about the people they like, showing affection for some, while trying to bite or scratch those they don't like.

ANIMALS CAN'T TALK, BUT THEY CAN TELL YOU A LOT ABOUT YOUR ENVIRONMENT!

Animal watching can be exciting because you never know what you might see. Animals are extremely mobile and can be secretive and reluctant to show themselves. To see animals, you must be alert, and always looking and listening all around.

FIELD SKILLS

Move quietly and gently.

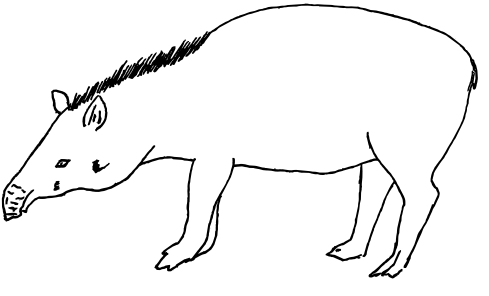
When bird watching, travel slowly: you can often see more birds by standing in one spot.

Watch for movement, shaking leaves, ripples in the water, then take a closer look to see what made it.

Use your ears. Listen for songs and calls of birds, then look in the direction they came from. Grass crunching or sticks snapping can also tell you that something is moving around.

Pay attention to behaviour; the way other birds and animals behave may alert you to other things. For example, if a flock of birds suddenly takes off, it may indicate the presence of a hawk.

Listen to stories about animals from your elders. Traditional and cultural information is important to ensuring a Makushi way of life! Stories about hunting and fishing trips will also give you hints about animal behaviour and the skills necessary to find the animals.



SOME THINGS TO CONSIDER WHEN LOOKING FOR WILDLIFE

Time of day: The hour before and after sunrise is the peak for bird activity. Some animals are **nocturnal**, and are active during the evening and night.

Habitat: This is the environment that an animal favours. Spider monkeys prefer big forest and capybaras like grassy swamps and slow rivers.

Diet: Some birds eat fish, some eat insects, some eat fruit. If you find an animal's favourite food, chances are you will find the animal! Harpy eagles share the habitat of their prey, the sloths and monkeys. Anaconda often bask on sunny grassy banks where an unsuspecting capybara may forage! For birds, check drying ponds for fish eaters, trees bearing fruit for fruit eaters and insect eaters who will be feeding on rotting fruit.

Comfort: Is it hot and sunny, wet and rainy? Could the animals be resting in the shade?

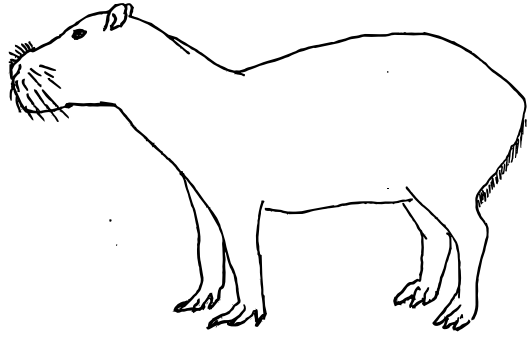
Weather and seasonal changes: Most birds don't fly during heavy rainfall as wet feathers would weigh them down and make them cold. But after a rain, they come out to dry their feathers, and swifts and swallows come out to feed on flying incests. At the beginning of dry and rainy seasons, many animals may move to different places, following their food.

During the rainy season, low lands flood and many animals will look for high and dry land during this time, especially animals like snakes, labba and armadillos who live in dens in the ground.

During the dry season, animals will need a source of water for drinking and keeping cool. As the rivers and ponds drop, animals like caiman, otters and fish will be concentrated in these areas.

If you see birds carrying bits of sticks and grass, they may be nesting.

Paying attention to these details will help you find the animals!



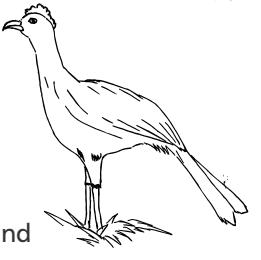
BIRD MONITORING

A **transect** is a trail. If you monitor the same transect or trail over time, the data collected will eventually tell a story about the animals and plants there.

Method

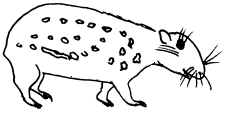
- choose a trail or clear a transect 1 km long;
- twice a month, take a "walk" on it. Make sure you go at the same time of day each time. Early morning is a good time to see birds;
- record the birds you see on the transect;
- if you have more than one transect in different habitat or forest type, you may learn more about the wider environment and the other things that live there; and
- if there are a lot of people, divide into groups, with each group being responsible for a specific transect. It is optional for the groups to rotate the transects so that everyone can experience all the different transects.

Personnel and Equipment



- ranger, guide or someone who knows their birds;
- GPS (to determine the 1 km);
- at least 1 pair of binoculars;
- bird guidebook;
- cutlasses (for cutting the trail in the forested areas); and
- data sheets (notebook, pencil).

Data collection is a fancy term for writing down what you saw. If you continue to collect **data** about the birds, it will eventually tell a story. If you continue for a year or more, you will have evidence of what species exist at different times of the year and their habits. You can now make an informed decision on how you use the land or animals.



The types of bird data you can collect include:

- **Transect**: This is where the name of the village is to be entered.
- **Observers**: Names of people involved in the transect.
- **Weather**: Circle the weather condition.
- **Date**: The date you conducted the transect.
- **Time start and time end**: The time you started and ended the transect.
- **Bird Name**: The common name of the bird.
- **# Seen**: Use tally marks to show the number of individuals observed for that species.
- **Nesting: Yes / No**: Circle the appropriate response based upon your observation; if the bird is on the nest, has young or is carrying nesting materials.
- **Notes**: Any additional information about the birds, their behaviour or interesting observations including mammals, tracks, people can be put here.

EXAMPLE OF A BIRD MONITORING DATA SHEET

Transect name: _____ Weather: Sunny Cloudy

Time start:_____ Time end:_____ Partly cloudy Rain

Names of observers:_____

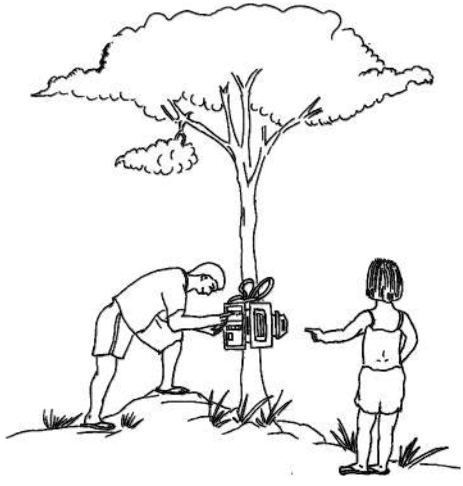
_____

	Bird ame	# Seen	Nesting
1	Sun parakeet	~~IIII~~	Yes / No
2			Yes / No
3			Yes / No
4			Yes / No
5			Yes / No
6			Yes / No
7			Yes / No
8			Yes / No
9			Yes / No
10			Yes / No
11			Yes / No
12			Yes / No
13			Yes / No
14			Yes / No
15			Yes / No
16			Yes / No
17	Add more rows if you need them		Yes / No

Notes:_____

USING A CAMERA TRAP

A camera trap can help you "see" what uses an area. Look for animal tracks, "roads" or signs (scratch, poop, fur, etc) and set the traps near these places.



You will need a camera trap, fresh batteries, an SD memory card and a cutlass.

Insert the batteries as shown in the trap and the memory card.

Open the door of the trap and put the switch to "SET UP". Check the date, time, and select photos or videos and the timings between each. After set up, turn the switch "OFF".

Fasten the camera trap to a sturdy tree, just above or at knee height. Check to make sure the trap is level and not pointing directly at the ground or the sky!

Using a cutlass, clear grass and vegetation in front of the camera.

Flip the switch to "ON", close and latch the door. A red light will blink to tell you the camera is armed and ready to go.

Test the camera by walking in front of it.

Open the camera, switch to "OFF". Take out the memory card and view the images on the card. Adjust the settings and angle of the camera.

Reinsert the memory card and put the switch to "ON", and leave the camera to do its job!

Videos take up more memory than photographs. If you set the camera to take video you will have to check it sooner than you would if you set it for photos.

You need to check the camera monthly or so to clear vegetation that may have grown up, to make sure the memory card is not full or batteries are not dead. If the camera is set near a body of water, it should be moved before the rainy season.

When removing the camera trap, open the door and turn the switch to "OFF". Remove the camera from the tree. When you get home, remove the memory card and check the photos on a computer.

EXAMPLE OF A CAMERA TRAP DATA SHEET

Species	Bush rat	Ground dog	Thrush	Powis	Lizard	Agouti	Toad	Bat	Fox	Dog	Humans	Margay	Raccoon
Date													
16-Feb	1												
18-Feb													
19-Feb	1	1	1										
20-Feb			1										
22-Feb				1									
23-Feb				1	1								
24-Feb				1									
27-Feb		1				1							
28-Feb				1			1		1	1	2		
29-Feb													
1-Mar											4		
2-Mar	1												
3-Mar		1											
4-Mar			1	1									
6-Mar				1		1							
7-Mar		1											
9-Mar						1							
10-Mar				1		1		1					
14-Mar						1						1	
16-Mar											7		1
Frequency	**3**	**4**	**3**	**7**	**1**	**6**	**1**	**1**	**1**	**1**	**13**	**2**	**1**

ANALYZING THE CAMERA TRAP DATA

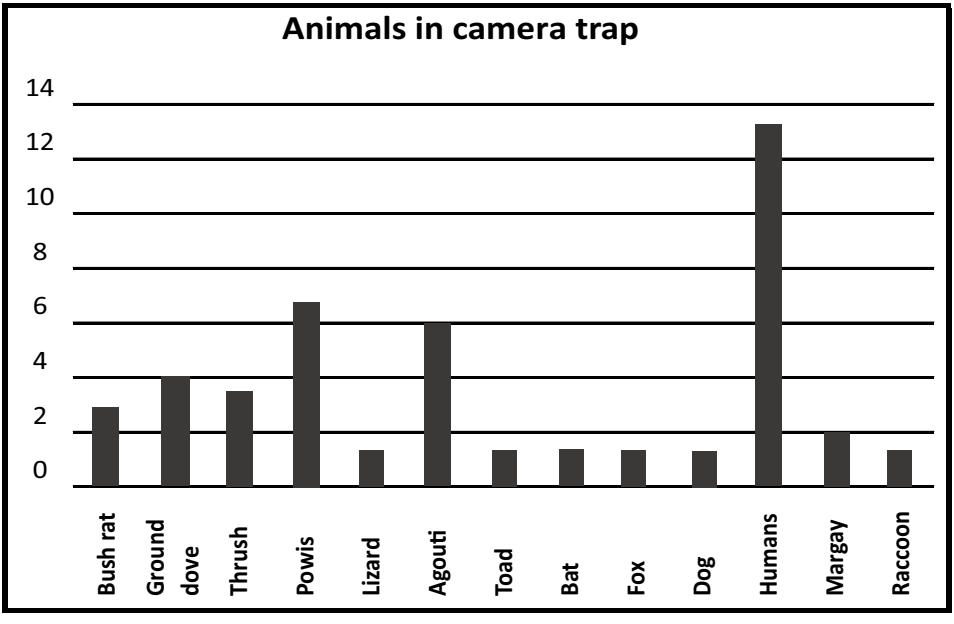
Copy the photos from the memory card to the computer.

Look at all the photos, then look at them again.

If you see an animal, write the date it appeared in the left-hand column and the species in the next column. Make a tally mark for the number of animals seen that day.

Continue looking at the photos. If you see new animals on the same date, list the animal and tally it. If it is a new day, record the date in the date column and tally the animals seen along that row for the date.

EXAMPLE OF A GRAPH SHOWING CAMERA TRAP DATA



DATA TELLS A STORY

How many species overall were there?

Of these, how many were mammals, birds, reptiles, etc.

What animal were there the most photos of?

What animal were there the fewest photos of?

WHAT DOES IT MEAN?

Compare the different numbers of animals seen. Why do you think there are more of some animals and fewer of others?

How many nights was the camera trap out for?

What do you think you might see if the camera was out for more time or less time?

What do you think is happening in this area?

Are different species using the area? And does this affect human use?

Will human use affect the animals?

How can the community mitigate conflict or overhunting?

Count up the number of days that the camera was on and working correctly. Count the number of times that each species was photographed. Divide the number of times each species was photographed by the total number of trap nights that the camera was working. This is **relative abundance**, the rate at which photographs were taken of each species. This allows you to make some comparisons about how common a species is compared to other species or other areas. For example, if you have more photos of agouti than tapir, you can assume that they are more common than tapir even though you aren't counting the number of individuals of each species.

To compare the relative abundance number to other cameras that may have been out longer or shorter than yours, multiply this number by 100. This shows you the number of photos per 100 trap days.

Count up the total number of species that you photographed on your camera trap. This is **species richness** and it tells you how many different animals are in an area.

If multiple cameras are being set in one area, count the total number of cameras set. Then count the number of cameras that each species was photographed by. Divide the number of cameras where each species was photographed by the total number of cameras. This is **occupancy** and it tells you how much of the area each animal is using.

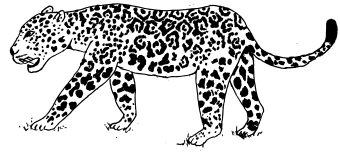
If an animal has stripes (Anteater), streaks (Ocelots), spots (Labba) or rosettes (Jaguars), you can identify individuals by their unique pattern (like your fingerprint). Using information about how often you photograph each individual (and some fancy math that you can learn later), you can calculate how many animals are around your area. This is how you can determine a **population** of a species.

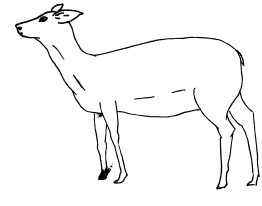
How do you know if you're seeing the same animal over and over again?

Unless an animal has distinct markings like spots, stripes or scars, we can't say if it's the same animal we're seeing all the time.

However, we can determine independent animal observations by looking at the time the photos were taken.

If there is half an hour between photos of the same species, it is counted as an individual record of that species.





POSSIBLE CITIZEN SCIENCE QUESTIONS

1. Are there more predators or prey in the ecosystem?

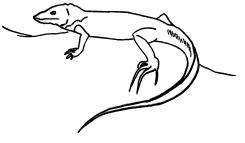
- Possible prediction: There will be more prey species than predators because there need to be more prey to support the predator population.

- Procedure:
  - Classify which animals are prey and which animals are predators.
  - Review photos and tally the number of each species.
  - Add the total number of prey sightings.
  - Add the total number of predator sightings.
  - Compare prey vs predator.

- Data Table

Animals	Predator or prey?	Count

- Graph
  - Bar graphs with two bars (one for prey, one for predator).



2. Will there be more birds or mammals in the pictures?

- Possible prediction: There will be more mammals because the cameras are located close to the ground and many birds spend more time in the trees out of sight of the camera.

- Procedure:
  - Classify which animals are birds and mammals.
  - Review photos and tally the number of each species.
  - Add the total number of birds.
  - Add the total number of mammals.
  - Compare birds vs mammals.

- Data Table

Animals	Predator or prey?	Count

- Graph
  - Bar graphs with two bars (one for bird, one for mammal).

3. Are there more _____ (chosen species) sightings during the day or night?

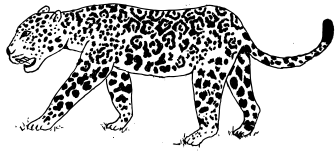
- Possible prediction: There will be more _____ sightings at night because...

- Procedure:
  - Determine what times are "day" and what times are "night".
  - Review photos and classify sightings as either day or night.
  - Add the total sightings at night.
  - Add the total sightings during the day.
  - Compare night vs day.

- Data Table

Night	Day

- Graph
  - Bar graphs with two bars (one for night, one for day).



Sometimes you will notice a slight movement or change in the photos. The camera may have been set off by shaking vegetation, or a small animal like a lizard or rat may have triggered the camera. If it's dark, look for eye-shine.

If you are not sure what the animal is, ask others what they think it is. The descriptions in field guides are also helpful.

After looking at a lot of camera trap photos, you may be able to recognize animals that have photobombed the camera trap, just by their ears or tail alone!

There are a lot of words in this book that may be new to you!
The meanings of all the words in **BOLD** are in the glossary at the back.
See if you can find the words in the puzzle below!

Vocabulary Word Search

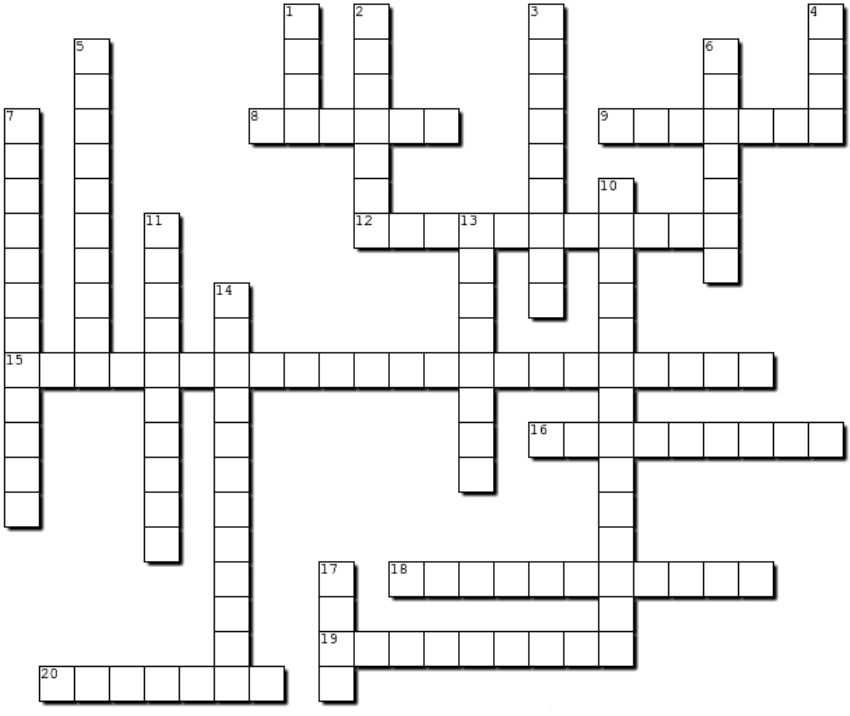
Search up, down, left, right and diagonally to find the words in the list.

N E X V E R T E B R A T E Y J N J K M O
L T X P N Z P F U B K C E M U K T I L M
I M I K I H O S D I V C M S S K K G J V
L M O D N I A E R O D Y N A M I C F E J
T K O L S N K C H D O M E S T I C J G N
E N D O T H E R M I C P R E E N T H A I
C Y Y X I Z E I H V H X B S O C I A L I
N A R S N A O A U E D M V S I L D Y R Y
O L E B C P D B I R T B R A V C J V E S
K E A M T H Y A E S V W H E H O W R N I
O N B H X T J E P I N P Q T C N P H O D
M H M A O C Y X L T M P N R O F N X N F
I I Z B V M Y O R Y E V S A C L P E D M
T A F I W L B T N T U D L N Z I T A E H
I A F T Z J D H T R U I Y S Y C R H R X
G X C A L Z Z E Y R S J L E P T B H S R
A I B T L N D R V O O O K C M O J D Y T
T K J D K J K M A T U C O T X R P M S V
E R D Y V K W I L D L I F E E L M A F W
Q Q I B T Y A C D X H S B O U Q F R H M

ADAPTED
AERODYNAMIC
BIODIVERSITY
CONFLICT
DOMESTIC
ENDOTHERMIC
EXOTHERMIC
INSTINCT
HABITAT
MITIGATE
MOLT
NYMPH
PREEN
PREY
SOCIAL
TRANSECT
VERTEBRATE
WILDLIFE

Vocabulary Crossword Puzzle

Complete the crossword puzzle below



Across

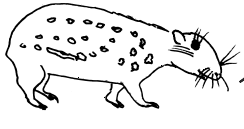
8. A hole.
9. Material that makes up hair and fingernails in people and feathers in birds
12. To be caring and to look after something
15. The number of photos of an animal taken over the survey time.
16. How often something occurs.
18. In birds, three toes facing forwards, one facing backward
19. Elected leaders responsible for carrying out the activities of their group.
20. Type

Down

1. Information gathered, this could be numbers or words.
2. To keep an eye on something and take care of it.
3. To be active at night
4. Soft, fluffy feathers.
5. In birds, two toes facing forwards, two facing backwards.
6. Developed over time.
7. Not symmetrical, lopsided.
10. The business of buying and selling wild animals.
11. Plants including grass, vines, shrubs, bushes, trees
13. An animal that hunts others for food.
14. An animal without a backbone.
17. An animal which is hunted for food.

Use the hints to find the words in bold in the book.

Then follow the numbers across and down to fill in the crossword puzzle.



FISHERIES MANAGEMENT IN THE NORTH RUPUNUNI

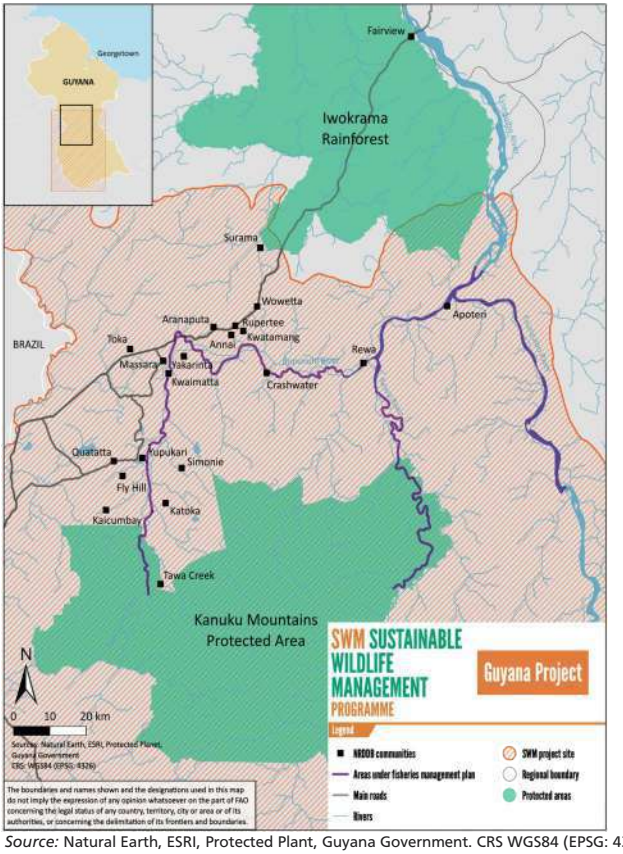
Fish are an important resource and source of food for the people of the North Rupununi. The NRDDB has been working with communities on fish management and has two local plans to address fisheries locally:

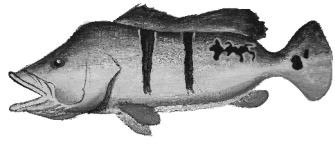
- General Fisheries Management Plan of 2011
- Arapaima Management Plan of 2001

The Sustainable Wildlife Management Project in Guyana is supporting the implementation of the NRDDB General Fisheries Management Plan from 2019 to 2023.

The NRDDB Fisheries team patrol rivers, collecting data on fish caught, how long it took to catch the fish, if they are sold and if they are eaten locally.

The Fisheries team is not stopping people from fishing, but reminding fishers of their responsibility to TAKE ONLY WHAT YOU NEED. The team also reminds fishers that it is ILLEGAL to harvest arapaima. The team will report any illegal activities to the village councils, NRDDB, police and the Department of Fisheries.





The dark lines on the rivers show the NRDDB fisheries management **area.**

The Ministry of Agriculture, Department of Fisheries supports the NRDDB's fisheries management plans.

Source: Natural Earth, ESRI, Protected Plant, Guyana Government. CRS WGS84 (EPSG: 4326)
Map conforms to UN 2020. Map 4170, Rev. 19. https://www.un.org/geospatial/content/map-world

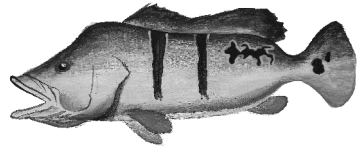
WORD SEARCH

Fish of the North Rupununi

Find the fish in the word list by searching up, down, left, right and diagonally. Words can also be backwards!

F R L U T Y N M W C A B A T R A C T K T
F U R E G A L U A M I R I P K X K Y R V
L O P N D K L X L A F T H U A K Y I A N
B I A L S A L T C Z Q Y A R R O W X K A
I M L Q W T B Y U W R X R J C B D S N Y
A H B A E U S A B F O X F I S H P D I D
U W D A I X H D K K L R E D P A C U L J
A N A H R I P A R A W A N A R Z Q M B O
L H J S I Z B J S A N H A A F N F A B N
H Z I U H R T U B S Z Z M C X O S J I Z
O O K I V S U D S A A I E S E T H A E P
J A R A P A I M A H A H C A W T A P Y H
U H V H B W Q F A H Y A I L Q A H A X I
C T Y Y O S R M R K Q M L N P I R H N B
S R A S O Q U K W E I W O W E G S A H B
S M O I M H D A R W G V P U N M N G T W
U U I E B F N P R T B I I I T A G G H E
X Q O N O M G U C A L B T U K H D M S H
D P R N O S T L H Q I S V U T E E K S M
S R N A M W U N D W N B L T I L L U C Z

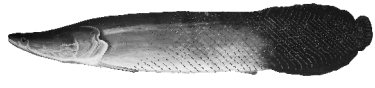
FOXFISH
BUSHYMOUTH
BLINKA
BIARA
HAIMARA
TIGERFISH
STINGRAY
AMIRI
SKEET
PATWA
AMURI
LUKANANI
YARROW
CARTABAC
MANGY
CULLIT
KABADEL
SIENNA
DAWALU
ARAPAIMA
REDPACU
HASSA
ARAWANA
YAKATU
PIRHANA
BOOMBOOM
POLICEMAN



ARAPAIMA POEM

Look at me and tell me what you see
Some may say “It’s just a fish”, or “That's my regular dish”,
But no, I am an arapaima,
One of the largest endangered species in Guyana.
I travel in a citizen's effort
In search of a good home river,
But in doing so, I have to be very clever
Or I might be caught or trapped forever.
As I grow my size makes it difficult for me to travel freely
Because a large space of water is needed to supply me.
Due to cruelty and reckless fishing,
Thousands of my family go missing.
As our number grew lesser and lesser each day
We swam farther and farther away.
Then years after that exploiting
I notice our family start back multiplying,
And I said to myself “There is protection and conservation”
Or good counselling and a great vision,
But it was all in one;
Days of trapping and exploiting are all done.
So as young people in today's generation
Let’s make a plan for the upcoming nation.
Preservation, conservation and protection.

By Claudia Allicock, Surama



THE NORTH RUPUNUNI JUNIOR WILDLIFE DEVELOPMENT COUNCIL

The NRJWDC is part of the NRDDB and represents clubs and youth.
The logo shows some of the core values of wildlife clubs of the North Rupununi including trees, water, birds and the people who take an interest in these things.

Some club activities could include:

- animal monitoring;
- learning about your indigenous culture;
- art and poetry;
- clean-up campaigns;
- public speaking;
- club exchange visits;
- games and sports;
- keeping nature trails clear; and
- bring and buy sale, bingo, selling produce from the club garden.

GLOSSARY

1. **Adapted:** Developed over time.
2. **Analyze:** To examine and explain what data mean.
3. **Anisodactyl**: In birds, three toes facing forwards, one facing backward.
4. **Aerodynamic**: Sleek, to avoid being dragged down by wind or air.
5. **Asymmetrical**: Not symmetrical, lopsided.
6. **Biodiversity:** Many different life forms.
7. **Cavity**: A hole.
8. **Conflict**: Trouble and problems between two parties.
9. **Data:** Information gathered; this could be numbers or words.
10. **Domestic**: Animals that have evolved to work with people. For example, dogs, cows, horses and chickens.
11. **Down**: Soft, fluffy feathers.
12. **Endothermic**: Refers to animals that produce their body heat. Mammals are endothermic.
13. **Executive**: Elected leaders responsible for carrying out the activities of their group.
14. **Exothermic**: Refers to animals that get their body heat from their environment, warming their body in the sun, cooling in the water or shade. Reptiles and amphibians are exothermic.
15. **Frequency**: How often something occurs.
16. **Instinct**: Natural behaviour.
17. **Invertebrate:** An animal without a backbone.
18. **Habitat**: The specific type of place where something lives.
19. **Keratin**: Material that makes up hair and fingernails in people and feathers in birds.
20. **Mitigate**: To reduce the chance of something happening.
21. **Monitor**: To keep an eye on something and take care of it.
22. **Molt**: To change feathers.
23. **Nocturnal**: Active at night.
24. **Nymph**: A stage in the life of a young insect like grasshoppers, dragonflies and cockroaches.
25. **Predator**: An animal that hunts others for food.
26. **Preen**: To clean and tidy feathers.
27. **Prey**: An animal that is hunted for food.
28. **Respiratory system**: Parts of the body needed to breathe including the lungs.
29. **Responsible**: To be caring and to look after something.
30. **Social**: Spends time with others.
31. **Species:** Type.
32. **Transect:** A trail which is monitored regularly.
33. **Vegetation:** Plants including grass, vines, shrubs, bushes, trees.
34. **Vertebrate**: Animals with a backbone.
35. **Wildlife Trade**: The business of buying and selling wild animals.
36. **Wildlife**: All wild animals in nature.
37. **Zygodactyl**: In birds, two toes facing forwards, two facing backwards.

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